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Lai et al.

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(54) **CARD CONNECTOR WITH TERMINAL PROTECTION**

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(51) **Int. Cl.**
H01R 24/00 (2006.01)

(52) **U.S. Cl.** **439/630**

(58) **Field of Classification Search** 439/630,
439/631

See application file for complete search history.

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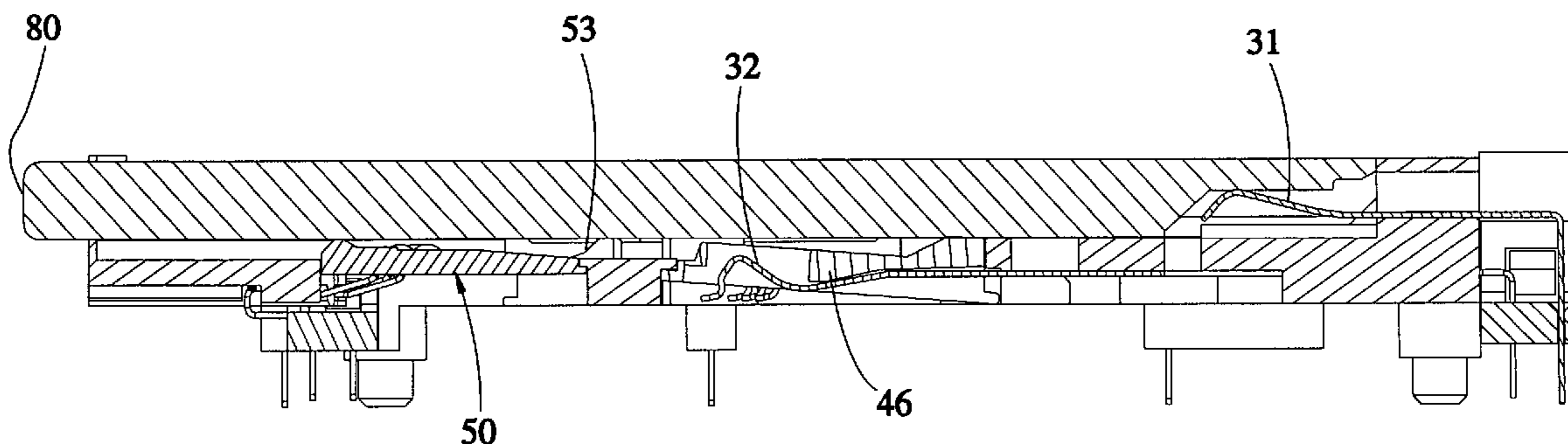
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(57) **ABSTRACT**

A card connector includes a housing defining multiple accommodation chambers, pressure boards respectively and vertically movably accommodated in the accommodation chambers, each pressure board having slots and rear bearing portions protruding over the top wall, and multiple sets of metal terminals mounted in the housing and respectively curving upwardly forwards in the accommodation chambers to support the respective pressure boards in the respective accommodation chamber. By means of the effect of the rear bearing portions of the pressure boards, the inserted memory card touches only the matching metal terminals and the other metal terminals that do not match are kept away from the inserted memory card, preventing damage.

6 Claims, 12 Drawing Sheets



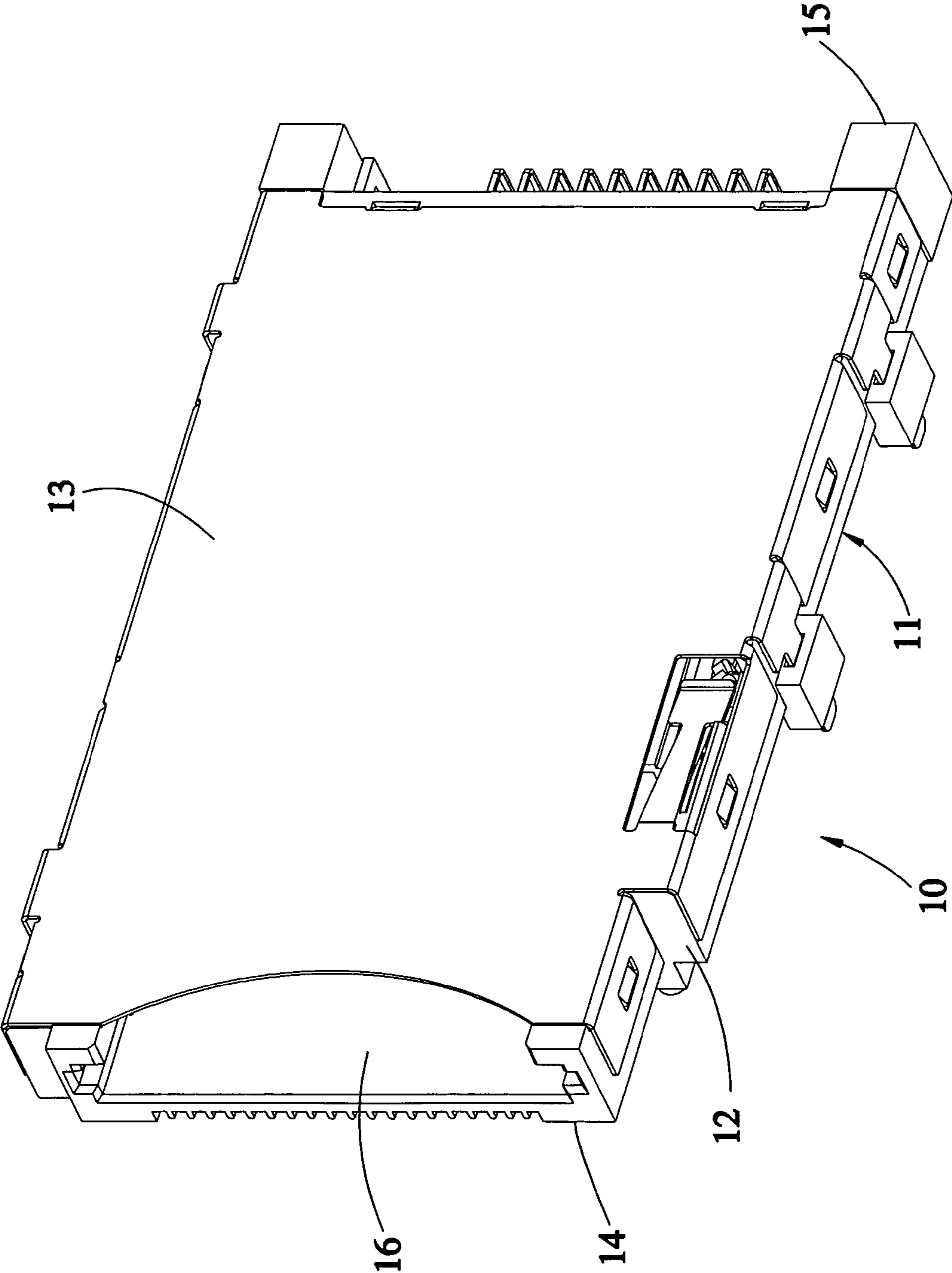


FIG. 1

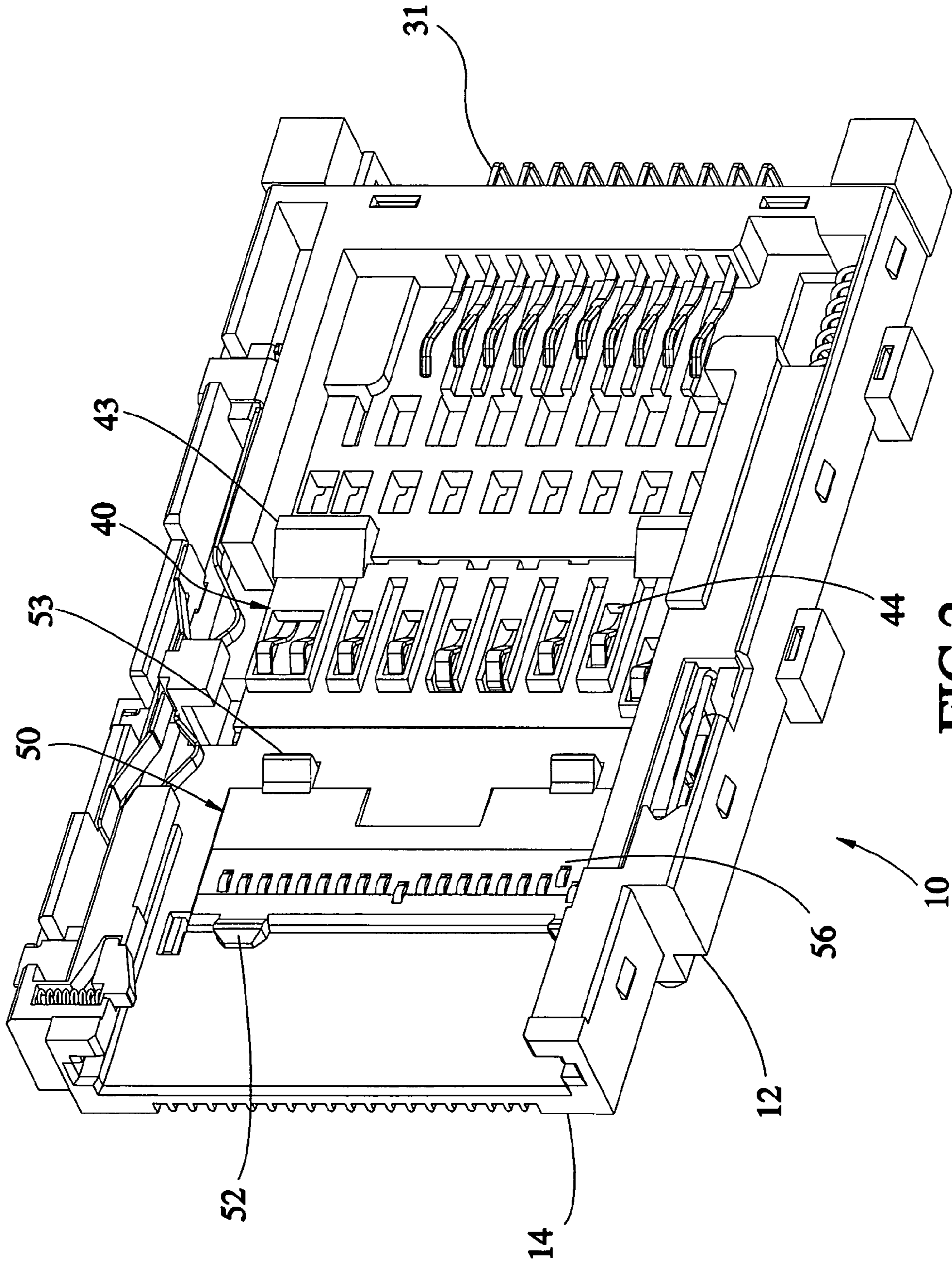


FIG. 2

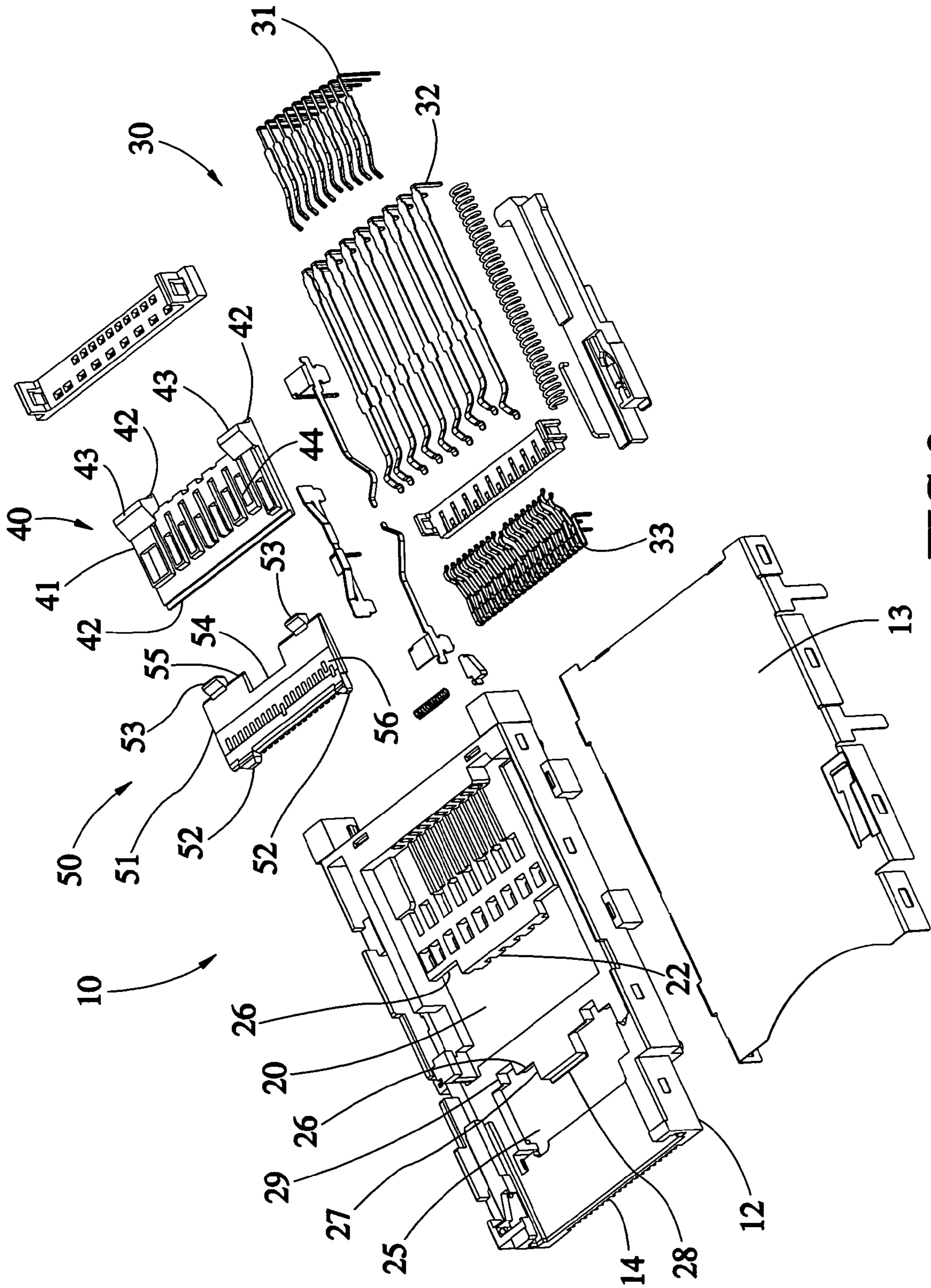


FIG.3

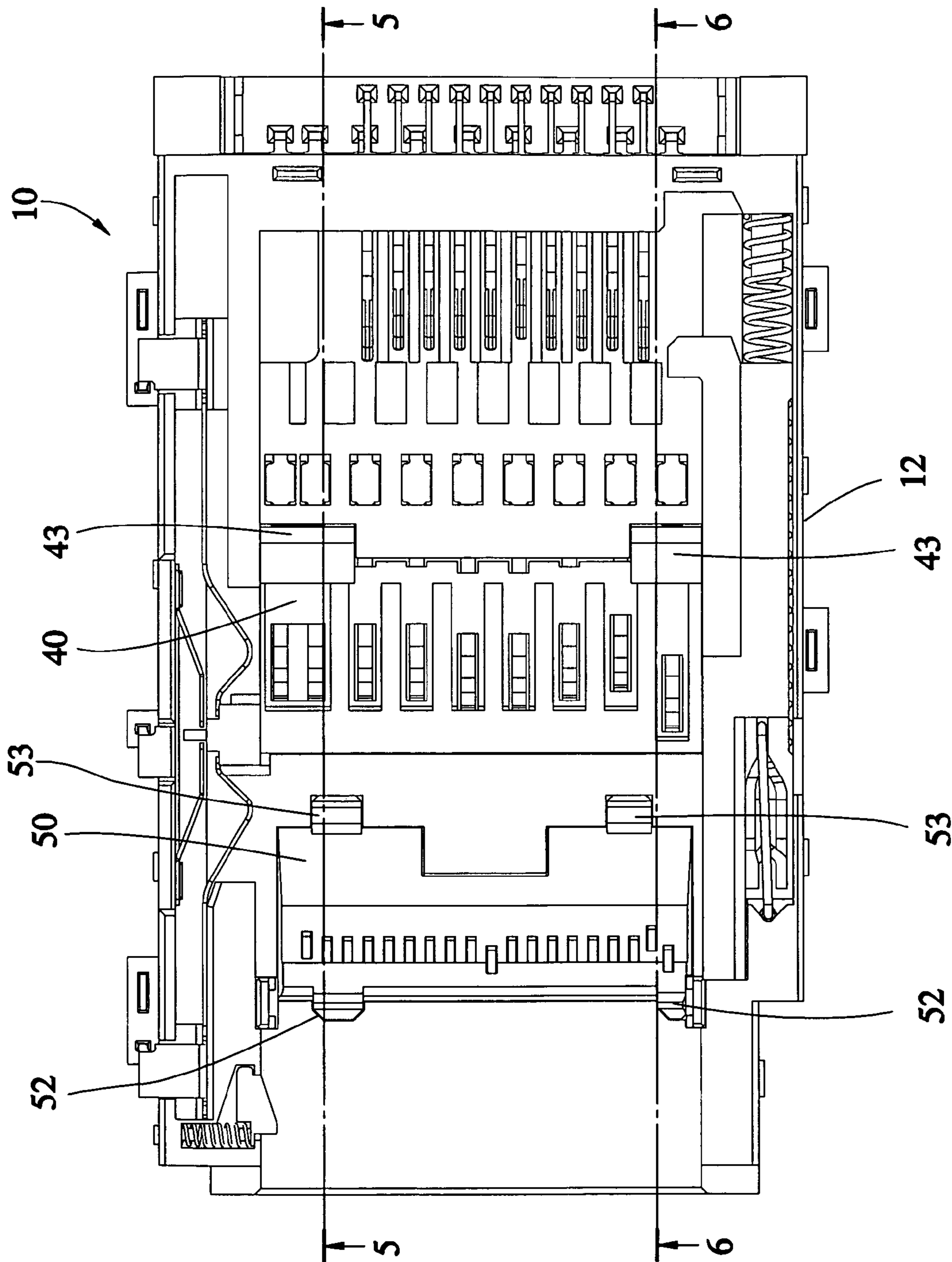


FIG. 4

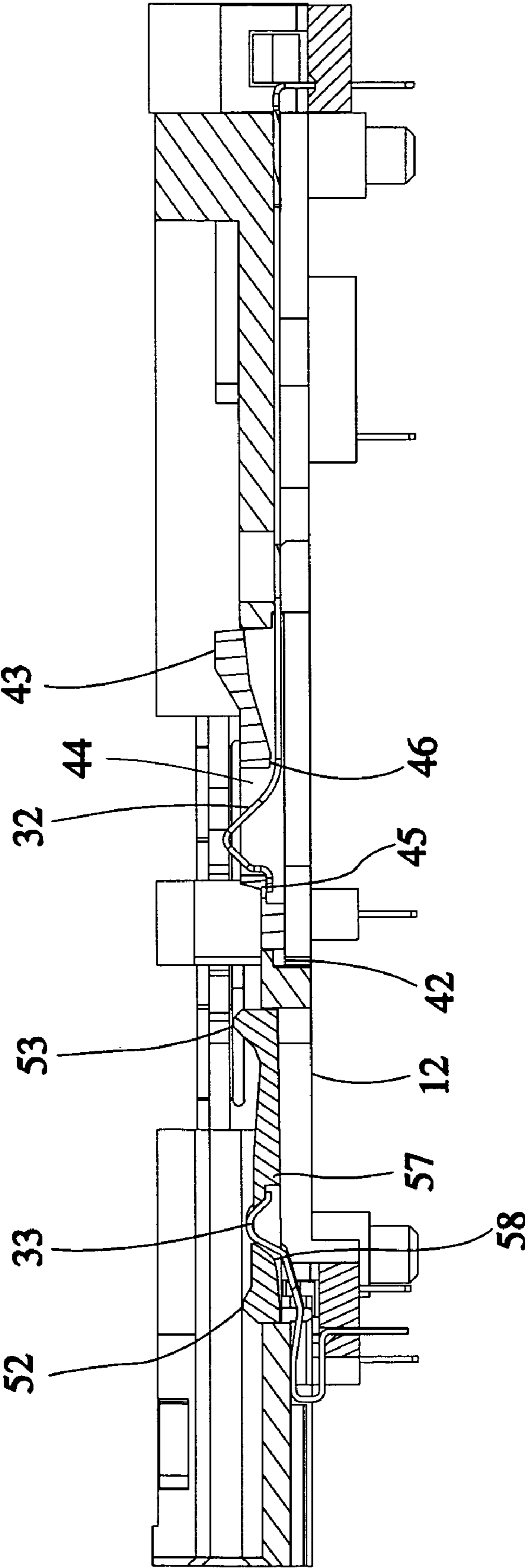


FIG. 5

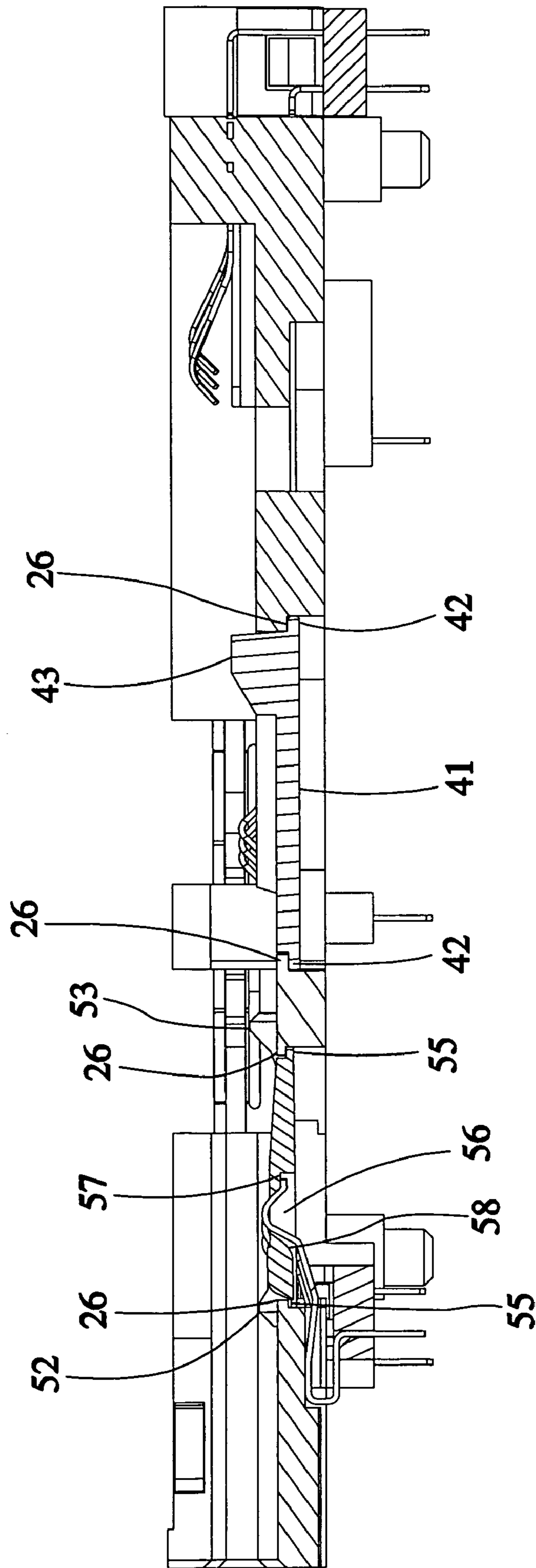


FIG.6

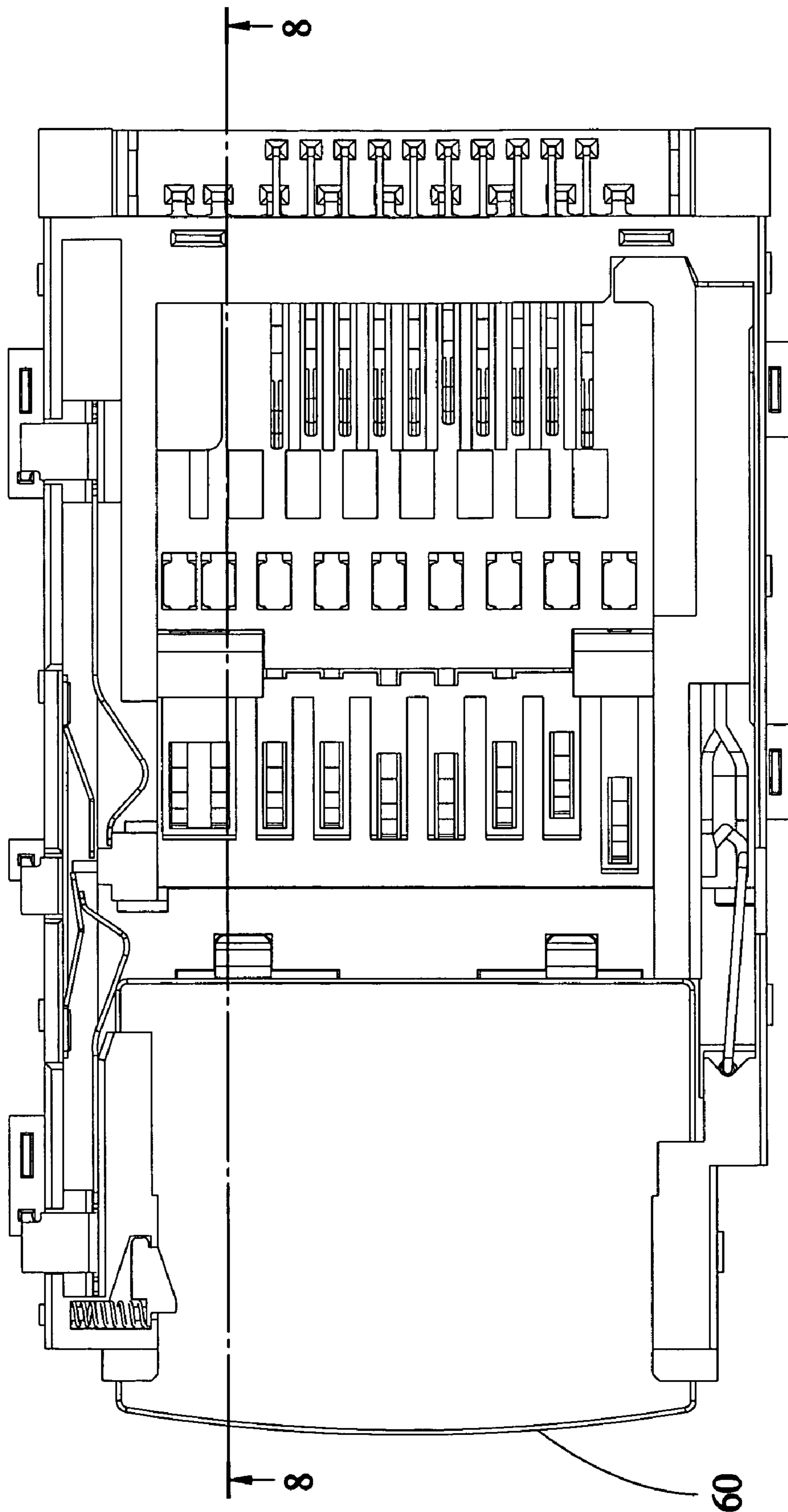


FIG. 7

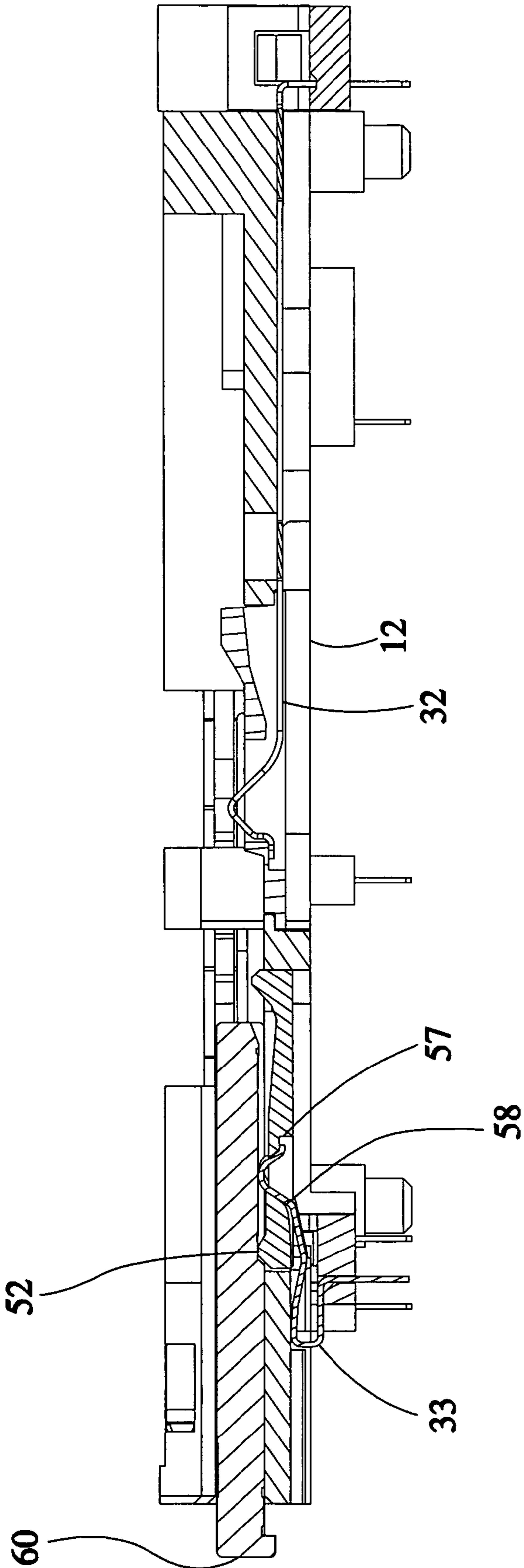


FIG. 8

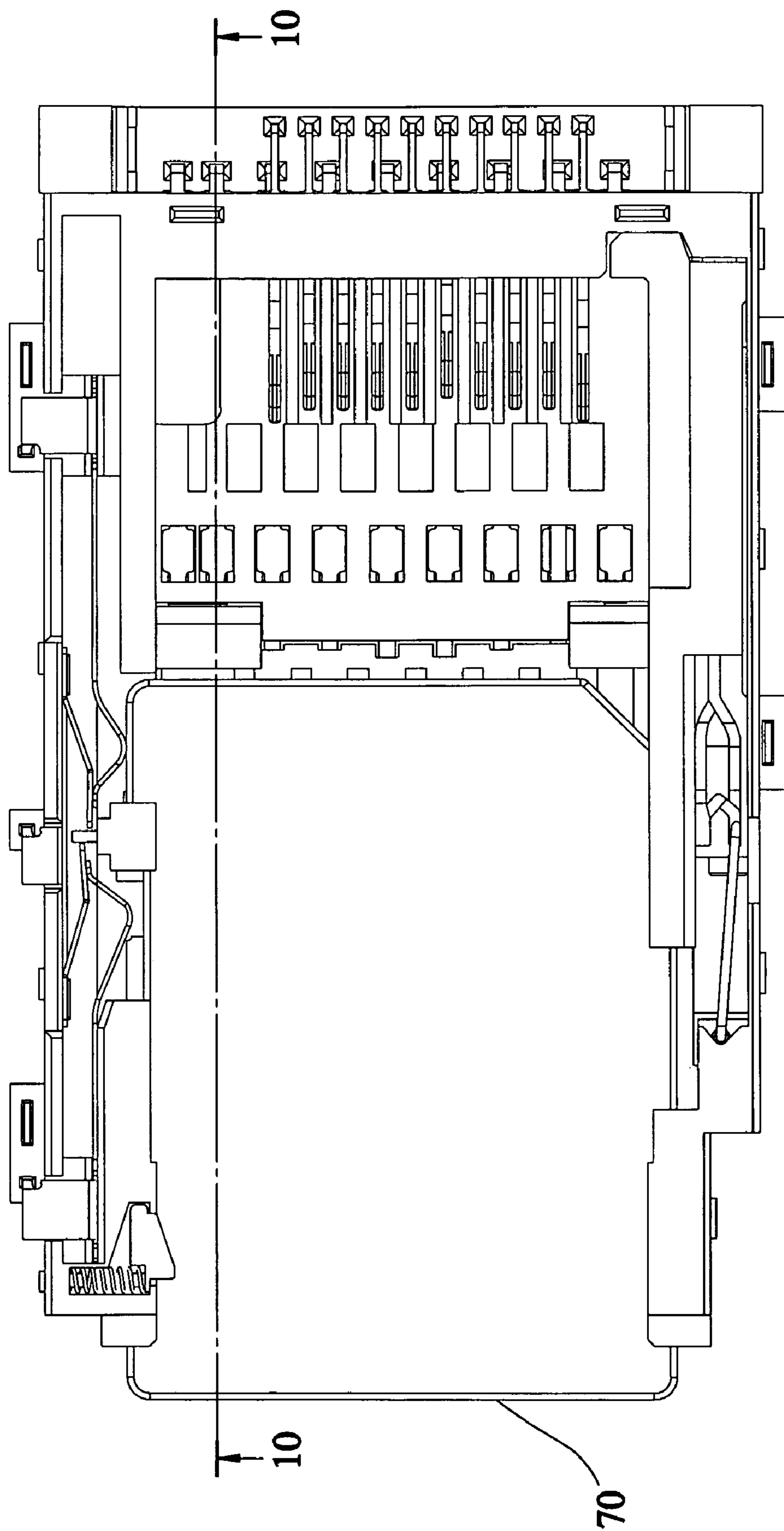


FIG. 9

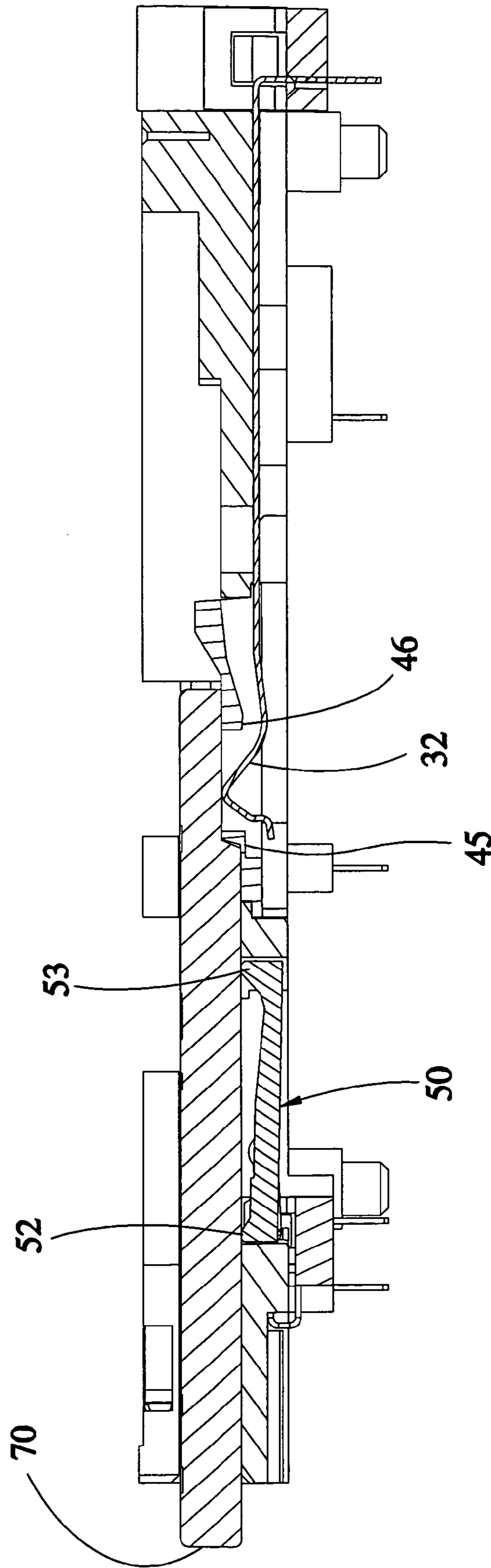


FIG.10

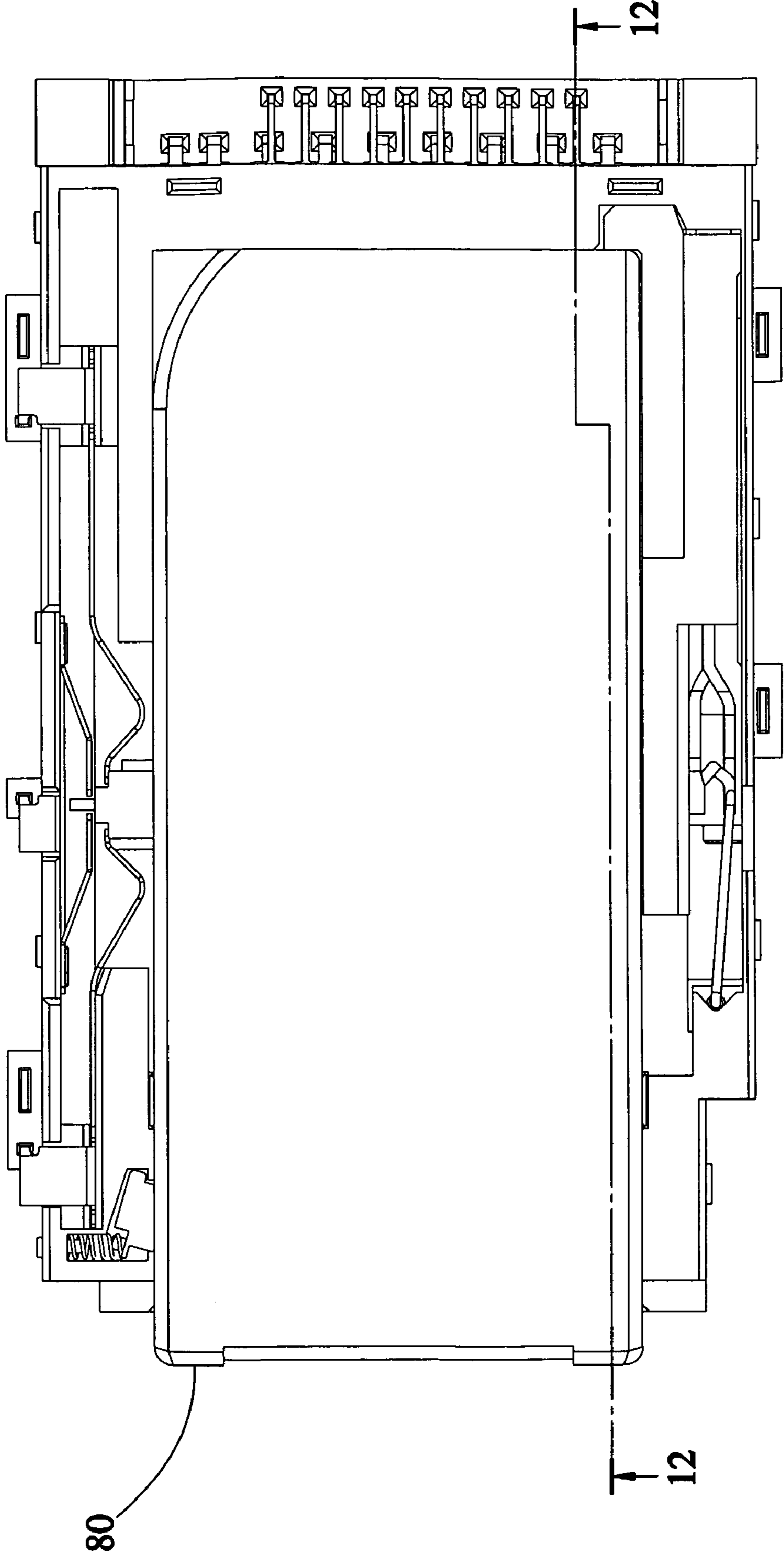


FIG. 11

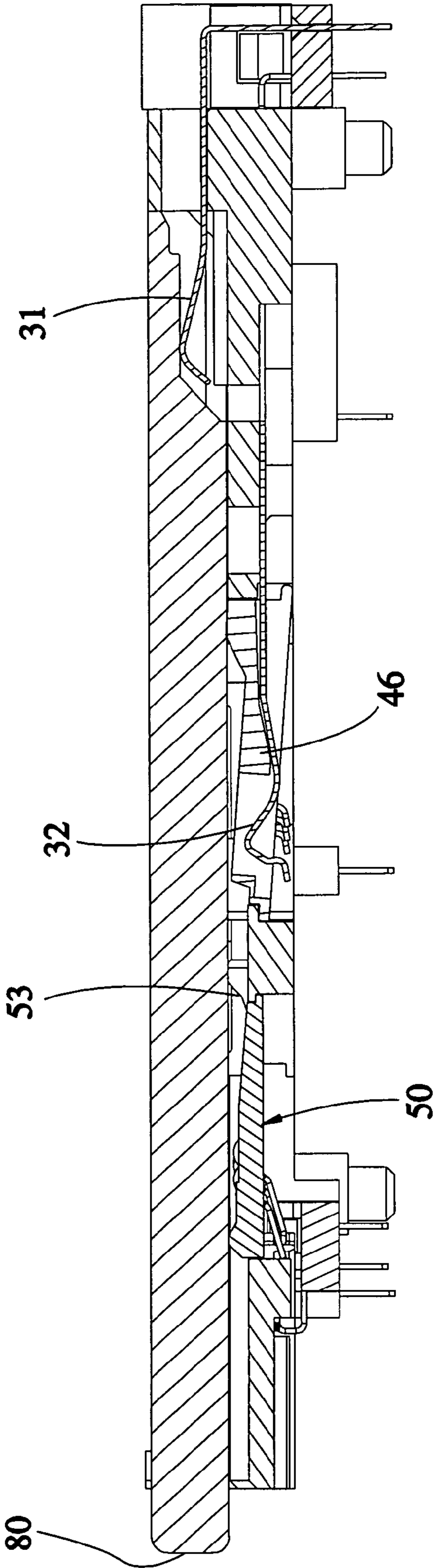


FIG.12

CARD CONNECTOR WITH TERMINAL PROTECTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to electrical connection devices and more particularly, to a card connector that has means to protect the metal terminals.

2. Description of the Related Art

Currently, there are four types of commercial memory cards, including MS (Memory Stick), SD (Secure Digital), MMC (Multi-Media Card), and XD (extreme Digital). To facilitate the use of different memory cards, various multi-in-one card connectors are disclosed. A multi-in-one card connector generally has multiple sets of metal terminals mounted inside the housing at different locations corresponding to the contact ends of different memory cards so that different memory cards are insertable into the card connector.

In a multi-in-one card connector, all the metal terminals extend to the inside of the housing. When inserting one particular memory card into the housing, it may rub on or hit the sets of metal terminals that do not match accidentally, causing these metal terminals to be biased and affecting normal functioning of the card connector. Taiwan Patent Number M249,333 teaches the use of metal terminal protection means to prevent the aforesaid problem. According to this design, a pivoted safety cover is provided. The safety cover is biased to press on the other metal terminals that do not match upon insertion of one memory card. Therefore, the inserted memory card touches only the matching set of metal terminals, and the other sets of metal terminals are well protected.

However, because the safety cover of the aforesaid design is pivoted to the bottom housing of the card connector, it may wear quickly with a long time use. When the safety cover starts to wear, it may be unable to hold down the non-matching metal terminals or unable to return to its normal position. In this case, the card connector becomes useless.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is one object of the present invention to provide a card connector that assures accurate contact of the inserted memory card with the matching metal terminals, preventing damage to the other metal terminals that do not match the inserted memory card.

To achieve this and other objects of the present invention, the card connector comprises a housing, at least one set of metal terminals, and at least one pressure board. The housing has a front side, a rear side, at least one accommodation chamber defined therein between the front side and the rear side, and an opening formed in the front side in communication with the at least one accommodation chamber. The metal terminals each have a body projecting into the at least one accommodation chamber and curving upwardly forwards. The at least one pressure board is vertically movably mounted in the at least one accommodation chamber, each comprising a plurality of slots cut through top and bottom sides thereof and adapted for receiving the at least one set of metal terminals, and at least one bearing portion disposed at a rear side thereof and protruding over a top wall of the respective pressure board.

By means of the characteristic that each pressure board has at least one bearing portion disposed at the rear side and protruding over the top wall, the inserted memory card touches only the matching metal terminals and the other

metal terminals that do not match are kept away from the inserted memory card, preventing damage.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a card connector in accordance with the present invention.

FIG. 2 illustrates the internal structure of the card connector in accordance with the present invention.

FIG. 3 is an exploded view of the card connector in accordance with the present invention.

FIG. 4 is a top view of the card connector in accordance with the present invention after removal of the top cover.

FIG. 5 is a sectional view taken along line 5-5 of FIG. 4.

FIG. 6 is a sectional view taken along line 6-6 of FIG. 4.

FIG. 7 is a top view of the present invention, showing an XD card inserted into the housing.

FIG. 8 is a sectional view taken along line 8-8 of FIG. 7.

FIG. 9 is a top view of the present invention, showing an SD card inserted into the housing.

FIG. 10 is a sectional view taken along line 10-10 of FIG. 9.

FIG. 11 is a top view of the present invention, showing a MS card inserted into the housing.

FIG. 12 is a sectional view taken along line 12-12 of FIG. 11.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. 1-3, a card connector 10 in accordance with the present invention is shown comprising a housing 11, three sets of metal terminals 30, a first pressure board 40, and a second pressure board 50.

The housing 11 is formed of a base frame 12 and a top cover 13. The housing 11 has a front side 14 and a rear side 15. The front side 14 defines an opening 16 for the insertion of a memory card. The base frame 12 comprises a first accommodation chamber 20, a second accommodation chamber 25, two steps 26 respectively protruded from the top edge of the peripheral wall of the first accommodation chamber 20 and the top edge of the peripheral wall of the second accommodation chamber 25 and respectively suspending in the first accommodation chamber 20 and the second accommodation chamber 25, a first protrusion 22 protruded from the step 26 in the first accommodation chamber 20, a second protrusion 27 protruded from the step 26 in the second accommodation chamber 25, two notches 29 formed on the step 26 in the second accommodation chamber 25 at two sides of the second protrusion 27, and stop edge 28 at the bottom side of the second protrusion 27.

The three sets of metal terminals 30 are mounted in the housing 11, including a set of first metal terminals 31, a set of second metal terminals 32 and a set of third metal terminals 33. These three sets of metal terminals 30 respectively extend from the base frame 12 to the space in between the base frame 12 and the top cover 13. The first set of metal terminals 31 is mounted in the rear side 15 of the base frame 12 for the connection of a MS (Memory Stick) card. The set of second metal terminals 32 is mounted in the bottom side of the base frame 12 for the connection of a SD (Secure Digital) or MMC (Multi-Media Card) card. The second metal terminals 32 extend into the first accommodation chamber 20 and then curve forwardly upwards and then slightly downwards. The set of third metal terminals 33 is mounted in the bottom side of the base frame 12 near the front side 14 for the connection

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of a XD (eXtreme Digital) card. The third metal terminals **33** extend into the second accommodation chamber **25** and curves forwardly upwards.

Referring to FIG. **5** and FIG. **3** again, the first pressure board **40** comprises a first board body **41** that has a configuration fitting the first accommodation chamber **20**, two first bearing portions **43** disposed at one side, namely, the rear side of the first board body **41**, and a plurality of shoulders **42** respectively disposed at the other side, namely, the rear side of the first board body **41** and the bottom side of each of the first bearing portions **43**. The first bearing portions **43** protrude over the top wall of the first board body **41**. The first board body **41** further has a plurality of first elongated slots **44**, a first support portion **45** at the front bottom side of each first elongated slot **44**, and a first press portion **46** at the rear bottom side of each first elongated slot **44**.

Referring to FIG. **6** and FIG. **4** again, the first pressure board **40** is mounted in the first accommodation chamber **20** inside the base frame **12**, holding the two first bearing portions **43** at two sides of the first protrusion **22**. The second metal terminals **32** extend upwardly through the first elongated slots **44** and are stopped against the respective first support portions **45** to lift the first pressure board **40**, keeping the first bearing portions **43** in proximity to the rear side **15** of the housing **11**. Further, when the first pressure board **40** is lifted by the spring power of the second metal terminals **32**, the shoulders **42** will be stopped against the step **26** in the first accommodation chamber **20** and therefore the first pressure board **40** will never escape out of the first accommodation chamber **20**.

The second pressure board **50** comprises a second board body **51** that has a configuration fitting the second accommodation chamber **25**, two shoulders **55** respectively disposed at the front bottom side and rear bottom side of the second board body **51**, two protruding guide portions **52** bilaterally disposed at the front side of the second board body **51**, two second bearing portions **53** bilaterally disposed at the rear side of the second board body **51**, and a locating notch **54** disposed on the middle of the shoulder **55** at rear side of the second board body **51** between the two second bearing portions **53**. The protruding guide portions **52** and the second bearing portions **53** protrude over the top wall of the second board body **51**. The second board body **51** further has a plurality of second elongated slots **56**, a second support portion **57** at the front bottom side of each second elongated slot **56**, and a second press portion **58** at the rear bottom side of each second elongated slot **56**.

The second pressure board **50** is mounted in the second accommodation chamber **25** inside the base frame **12**, holding the two second bearing portions **53** in the notches **29** and having the locating notch **54** receive the second protrusion **27**. The third metal terminals **33** extend upwards through the second elongated slots **56** and are stopped against the second support portions **57** to lift the second pressure board **50**. Further, as shown in FIG. **5**, when the second pressure board **50** is lifted by the spring power of the third metal terminals **33**, the shoulders **55** will be stopped against the step **26** in the second accommodation chamber **25** and therefore the second pressure board **50** will never escape out of the second accommodation chamber **25**.

Referring to FIG. **5** again, when the card connector is not inserted with any memory card, the first pressure board **40** and the second pressure board **50** are respectively lifted by the set of second metal terminals **32** and the set of third metal terminals **33**. When an XD card **60** is completely inserted into the housing **11**, as shown in FIGS. **6** and **7**, the XD card **60** presses the protruding guide portions **52** of the second pres-

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sure board **50**, and the metal contacts of the XD card **60** are kept in positive contact with the third metal terminals **33** that protrude through the second elongated slots **56** of the second pressure board **50**.

Referring to FIGS. **9** and **10**, when a SD card **70** is inserted into the housing **11**, the bottom wall of the SD card **70** is directly pressed on the protruding guide portions **52** and second bearing portions **53** of the second pressure board **50** to force the second pressure board **50** downwards, causing the second press portions **58** to force the third metal terminals **33** downwards, preventing contact between the third metal terminals **33** and the inserted SD card **70**. After the SD card **70** has been fully inserted in the housing **11** into position, the metal contacts of the SD card **70** are kept in positive contact with the second metal terminals **32** that protrude through the first elongated slots **44** of the first pressure board **40**. When removing the inserted SD card **70** from the card connector, the third metal terminals **33** will return to their former position only after the SD card **70** has been completely moved away from the second pressure board **50**, achieving protection of the third metal terminals **33**.

Referring to FIGS. **11** and **12**, when a MS card **80** is fully inserted into the housing **11**, the bottom wall of the inserted MS card **80** is directly pressed on the first bearing portions **43** of the first pressure board **40** and the second bearing portions **53** of the second pressure board **50**, causing the first press portion **46** and the second press portion **58** to force the second metal terminals **32** and the third metal terminals **33** downwards, preventing contact between the second and third metal terminals **32** and **33** and the inserted MS card **80**, and allowing direction contact of the metal contacts of the inserted MS card **80** with the first metal terminals **32**, achieving protection of the second and third metal terminals **32** and **33**.

In conclusion, the invention has the advantages as follows:

1. Positive terminal holding-down function: Because the first and second pressure boards are vertically movably supported in the respective accommodation chambers by the respective metal terminals, the respective pressure boards will positively force the respective metal terminals downwards upon insertion of a memory card into the housing.

2. Simple structure design: By means of matching the first pressure board and the second pressure board with the configurations of the respective accommodation chambers to fit different memory cards, the pressure boards are vertically movable along the peripheral walls of the respective accommodation chambers to achieve the desired metal terminal protection function without any complicated pivot structure.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

What is claimed is:

1. A card connector comprising:

a housing, said housing having a front side, a rear side, at least one accommodation chamber defined therein between said front side and said rear side, and an opening formed in said front side;

at least one set of metal terminals mounted in said housing, said metal terminals each having a body projecting into said at least one accommodation chamber and curving upwardly forwards; and

at least one pressure board vertically movably mounted in said at least one accommodation chamber, said at least one pressure board each comprising a plurality of slots cut through top and bottom sides thereof and adapted for

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receiving said at least one set of metal terminals and having at least one bearing portion disposed at a rear side thereof and protruding over a top wall of the respective pressure board, wherein said at least one accommodation chamber each has a protrusion protruded from the periphery thereof; said at least one pressure board each has a locating notch that receives the protrusion of one said at least one accommodation chamber, and two bearing portions disposed at two sides of said locating notch.

2. The card connector as claimed in claim 1, wherein said at least one accommodation chamber each has at least one step; said at least one pressure board is respectively accommodated in said at least one accommodation chamber, each having a shoulder at one side thereof for stopping against the at least one step of the respective accommodation chamber.

3. The card connector as claimed in claim 1, wherein said at least one pressure board has a guide portion protruding over a top wall thereof.

4. The card connector as claimed in claim 1, wherein said at least one pressure board has a support portion at a rear

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bottom side of each of the slots thereof and a press portion at a front bottom side of each of the slots thereof; the bodies of said metal terminals are respectively stopped at the support portions of said at least one pressure board.

5. The card connector as claimed in claim 1, wherein said at least one pressure board has a support portion at a front bottom side of each of the slots thereof and a press portion at a rear bottom side of each of the slots thereof; the bodies of said metal terminals are respectively stopped at the support portions of said at least one pressure board.

6. The card connector as claimed in claim 1, wherein said at least one set of metal terminals include a set of first metal terminals fitting a memory card of MS (Memory Stick) standard, a set of second metal terminals fitting a memory card of SD (Secure Digital)/MMC (Multi-Media Card) standard, and a set of third metal terminals fitting a memory card of XD (extreme Digital) standard.

* * * * *